Alg. 2 Warm Up # 3-2

This is Week 3, day 2.
Name and Team # at the top!

1. Solve for y: $2x + \frac{1}{y} = 3$

2. Write an equation and solve:

A cable 84 meters long is cut into two pieces. One piece is 18 meters longer than the other. Find the length of each piece of cable.

3. Find the point of intersection of the 2 lines:

$y = 3x + 15$ and $y = 3 - 3x$

1. Solve for y: $2x + \frac{1}{y} = 3$

2. Write an equation and solve:

A cable 84 meters long is cut into two pieces. One piece is 18 meters longer than the other. Find the length of each piece of cable.

Preview

HW Questions:

1-84. Use any method to find the points of intersection of $f(x) = 2x^2 - 3x + 4$ and $g(x) = x^2 + 5x - 3$.

$2x^2 - 3x + 4 = x^2 + 5x - 3$

$x^2 - 8x + 7 = 0$

$(x-7)(x-1) = 0$

$x - 7 = 0$ or $x - 1 = 0$

(7

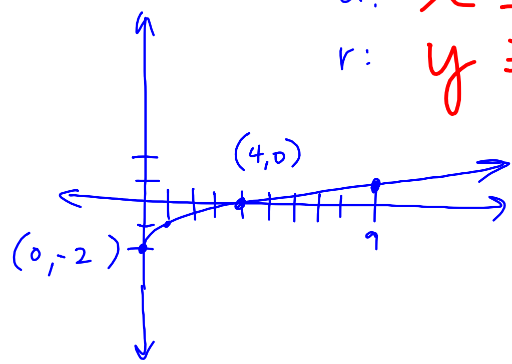
(1,

$\boxed{\text{1-86.}}$ Make a complete graph of the function $f(x) = \sqrt{x} - 2$, label its x- and y-intercepts, and describe its domain and range.

x	y
0	-2
1	-1
4	0
9	1

d: $x \geq 0$

r: $y \geq -2$



1-88. Carlo got a pet snake as a birthday present. On his birthday, the baby snake was just 26 cm long. He has been watching it closely and has noticed that it has been growing 2 cm each week.

let x = # of weeks

$26 + 2x$

1-90. Make a complete graph of the function $h(x)=2x^2+4x-6$ and describe its domain and range.

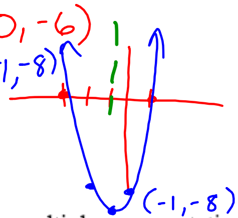
x-int: $(-3,0)$ & $(1,0)$

y-int: $(0,-6)$

vertex: $(-1,-8)$

d: $x = \mathbb{R}$

r: $y \geq -8$



$0 = 2(x^2+2x-3)$

$0 = 2(x+3)(x-1)$

$x+3=0 \quad x-1=0$

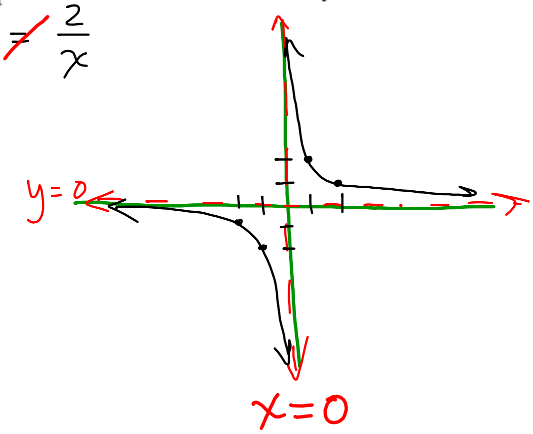
$x=3 \quad x=1$

$(3,0) \quad (1,0)$

1-92. Create multiple representations ($x \rightarrow y$ table, graph, and equation) of the function $g(x)=\frac{2}{x}$. Then make at least 3 summary statements.

x	y
−2	−1
−1	−2
0	undef.
1	2
2	1

$0 \neq \frac{2}{x}$



1-94. The *Salami and More Deli* sells a 5-foot submarine sandwich for parties. It weighs 8 pounds. Assuming that the weight per foot is constant, what would be the length of a 12-pound sandwich?

1-96. Graph the following equations.

a. $y - 2x = 3$

b. $y - 3 = x^2$

$(\ ,0)$ $(0, \ )$

c. State the x- and y-intercepts for each equation.

d. Where do the two graphs cross? Show how you can find these two points without looking at the graphs.

solve both equations for y, then set them $=$.

$$\left.\begin{aligned} y &= 2x+3 \\ y &= x^2+3 \end{aligned}\right\}$$

$$x^2+3 = 2x+3$$
$$x^2-2x = 0$$
$$x(x-2) = 0$$
$$x = 0 \qquad x = 2$$

$(0, \ )$

$(2, \ )$

Methods and Meanings — Math Notes

p.18

Domain and Range

The set of possible values for the input of a function is called the **domain** of the function. This set consists of every input value for x for which the function is defined.

The **range** of a function is the set of possible values of the output. This set contains every y-value that the function can generate.

Domain and **range** are often written with **inequality notation** as shown in the examples below.

The symbols $-\infty$ and ∞ represents positive and negative **infinity**. They mean that the domain goes on without ending in the positive or negative direction. Infinity is not a number; it is a concept.

If the domain is any number between and including –2 and 7: $-2 \le x \le 7$

If the range is any number greater than but excluding 4: $y > 4$ or $\cancel{4 < y < \infty}$

If the domain is all real numbers except for –3: $x \ne -3$

If the domain is all real numbers: $\mathbb{R}$ $-\infty < x < \infty$

Math Notes

Methods and Meanings

p. 10

Linear Equations

x' y'

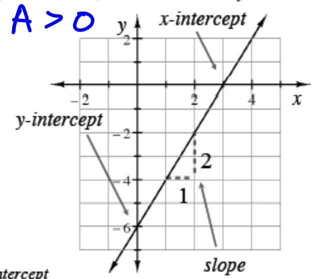
A **linear equation** is an equation that forms a line when it is graphed. This type of equation may be written in several different forms. Although these forms look different, they are equivalent; that is, their graphs are all the same line. → integers

Standard Form: An equation in $Ax + By = C$ form, such as $6x - 3y = 18$. $A > 0$

Slope-Intercept Form: An equation in $y = mx + b$ form, such as $y = 2x - 6$.

You can find the **slope** (also known as the **growth factor**) and the **y-intercept** of a line in $y = mx + b$ form quickly. For the equation $y = 2x - 6$, the slope is 2, while the y-intercept is (0, –6).

$y = \underset{\text{slope}}{2}x - \underset{\text{y-intercept}}{6}$



plot : (0, b)

use slope to get 2nd pt.

Methods and Meanings

p. 24

Solving a Quadratic Equation

In a previous course, you learned how to solve **quadratic equations** (equations that can be written in the form $ax^2 + bx + c = 0$). Review two methods for solving quadratic equations below.

Some quadratic equations can be solved by **factoring** and then using the **Zero Product Property**. For example, the quadratic equation $x^2 - 3x - 10 = 0$ can be rewritten by factoring as $(x-5)(x+2) = 0$. The Zero Product Property states that if $ab = 0$, then $a = 0$ or $b = 0$. So if $(x-5)(x+2) = 0$, then $(x-5) = 0$ or $(x+2) = 0$. Therefore, $x = 5$ or $x = -2$.

Another method for solving quadratic equations is using the **Quadratic Formula**. This method is particularly helpful for solving quadratic equations that are difficult or impossible to factor. Before using the Quadratic Formula, the quadratic equation you want to solve must be in standard form (that is, written as $ax^2 + bx + c = 0$).

In this form, a is the coefficient of the x^2-term, b is the coefficient of the x-term, and c is the constant term. The Quadratic Formula is stated at right.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

This formula gives two possible solutions for x. The two solutions are shown by the "±" symbol. This symbol (read as "plus or minus") is shorthand notation that tells you to evaluate the expression twice: once using addition and once using subtraction. Therefore, Quadratic Formula problems usually must be simplified twice to give:

$$x = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \quad \text{or} \quad x = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

Of course if $\sqrt{b^2 - 4ac}$ equals zero, you will get the same result both times.

To solve $x^2 - 3x - 10 = 0$ using the Quadratic Formula, substitute $a = 1$, $b = -3$, and $c = -10$ into the formula, as shown below, then simplify.

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(-10)}}{2(1)} = \frac{3 \pm \sqrt{49}}{2} = \frac{3+7}{2} \text{ or } \frac{3-7}{2}$$

$$x = 5 \quad \text{or} \quad x = -2$$

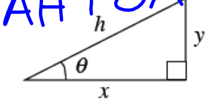
Math Notes: Methods and Meanings p. 29

Triangle Trigonometry

There are three **trigonometric ratios** you can use to solve for the missing side lengths and angle measurements in any right triangle: tangent, sine, and cosine.

In the triangle below, when the sides are described relative to the angle θ (the Greek letter "theta"), the opposite leg is y and the adjacent leg is x. The hypotenuse is h regardless of which acute angle is used.

SOH CAH TOA



$$\tan\theta = \frac{\text{opposite leg}}{\text{adjacent leg}} = \frac{y}{x}$$

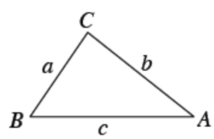
$$\sin\theta = \frac{\text{opposite leg}}{\text{hypotenuse}} = \frac{y}{h}$$

$$\cos\theta = \frac{\text{adjacent leg}}{\text{hypotenuse}} = \frac{x}{h}$$

Rt △'s

Not Rt △

In general, for any uniquely determined triangle, missing sides and angles can be determined by using the **Law of Sines** or the **Law of Cosines**.



$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

and

$$c^2 = a^2 + b^2 - 2ab\cos C$$

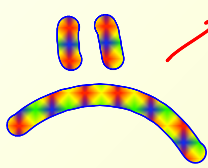
Finding intersections:

Method

with Algebra:

1. Equal Values
2. Substitution
3. Elimination

with Graphing:



1. Graph & guess where it looks like they cross

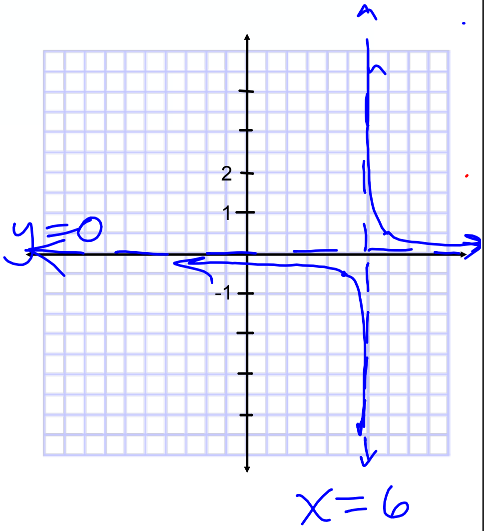
☺ ✱ 2. Use calc function on grapher

Pink CP's 1.2.2

for $y = \dfrac{1}{x - 6}$

x	y
3	
4	
5	
6	$\varnothing$
7	
8	
9	

y=0



dom: $x \neq 6$

range: $y \neq 0$

CP's: 1-98 ---> 100, 102 (use your own graph paper for this)

1.2.3 What do they have in common?

P. 41

The Family of Linear Functions

In Lesson 1.2.2, your team investigated functions of the form $f(x) = \frac{1}{x-h}$, where h could be any number. You learned that as you changed h, the graph changed, but the basic shape stayed the same. In this lesson, you will think about functions of the form $f(x) = mx + b$.

1-98. Consider functions of the form $y = mx + b$.

a. What do x and y represent in this function? What do m and b represent? Which ones can you change?

b. With the rest of the class, explore the effects of m and b on the function $y = mx + b$. What effect does m have on the graph? What effect does b have on the graph?

c. For this function, m and b are called **parameters** (as h was for $f(x) = \frac{1}{x-h}$), whereas x and y are called **variables**. With your team, explain the difference between a parameter and a variable.

d. What do all of the functions of the form $y = mx + b$ have in common? Since they all have the same basic relationship between x and y, they can be called a **family of functions**.

1-99. With your team, examine each group of equations below and discuss what you would see if you drew the graphs of the four equations on one set of axes. Write a description of what you imagine you would see. (You do not actually have to draw them.)

a. $x+2y=10$
$y=-\frac{1}{2}x+3$
$-4y=2x+8$
$y=-\frac{1}{2}x$

b. $5x+y=-3$
$y=-\frac{1}{2}x-3$
$3x-4y=12$
$5y-2x=-15$

1-100. Parts (a) through (f) below are six representations of a relationship between an input and an output. With your team, decide whether each relationship is linear and write a clear summary statement justifying your decision. If the relationship is linear, graph it and find its equation. If it is not linear, describe the growth.

a.

Pieces of Bread	*Grams of Fiber*
0	0
1	5
2	10
3	15
4	20

b. *Killer Fried Chickens charges \$7.00 for a basic bucket of chicken and \$0.50 for each additional piece. The input is the number of extra pieces of chicken ordered, and the output is the total cost of the order.*

c.

x	y
10	0
5	5
3	7
2	8
1	9
0	10

d.

x	y
10	1
5	2
4	2.5
2	5
1	10
0.5	20

e. *James planted a bush in his yard. The year he planted it, the bush produced 17 flowers. Each year, the branches of the bush split, so the number of flowers doubles. The input is the year after planting, and the output is the number of flowers.*

f.

x	y
0	–7
2	–2
4	3
6	8
8	13

1-102. Without using a graph, decide whether the relationship shown in the table at right is linear. Write a clear summary statement justifying your ideas. Be prepared to share your ideas with the class.

x	y
1	0.5
4	–7
10	–22
15	–34.5

HW: 1-

#104 ----> 110